

Hot Gas TVC For Planetary Ascent Vehicle, Phase I

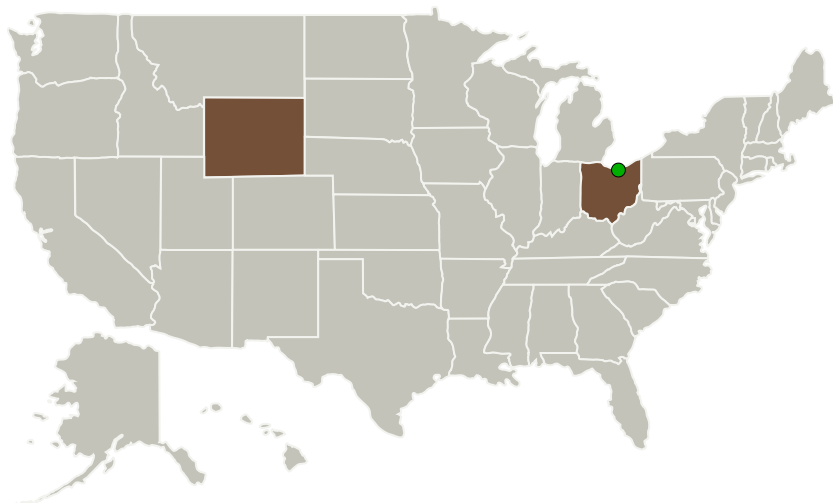
Completed Technology Project (2010 - 2010)



Project Introduction

A Mars ascent vehicle (MAV) uses solid rocket motors to propel soil samples into orbit, but the motors cannot provide steering. Cold gas thrusters are used for initial steering and spin stabilization for the final stage of flight. This approach is heavy and results in a spinning sample container in orbit, which is difficult to recover. Wickman Spacecraft & Propulsion Company (WSPC) proposes innovative hot gas thrusters for steering that use the gases from the solid rocket combustion chambers. This approach reduces weight and provides a non-spinning orbiting container to increase mission success probability. WSPC is the only company with hot, metalized gas valve technology. The MAV valves must handle metalized gases at 5,600 F. Minuteman motor experience and WSPC tests indicate that thin layers of tungsten in discrete valve locations would work for this application. WSPC will create a layout of a MAV hot gas TVC system to ensure the weight is less than the baseline cold gas system. Valve materials will be tested with the MAV propellant to ensure the valve operates properly. Phase II will be the testing of the TVC system with the first stage MAV solid rocket motor to simulate a MAV ascent into orbit.

Primary U.S. Work Locations and Key Partners



Hot Gas TVC For Planetary
Ascent Vehicle, Phase I

Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Project Transitions	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	3
Technology Areas	3
Target Destinations	3

Hot Gas TVC For Planetary Ascent Vehicle, Phase I

Completed Technology Project (2010 - 2010)



Organizations Performing Work	Role	Type	Location
Wickman Spacecraft & Propulsion Co.	Lead Organization	Industry	Casper, Wyoming
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
Ohio	Wyoming

Project Transitions

**January 2010:** Project Start**July 2010:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/140039>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Wickman Spacecraft & Propulsion Co.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

John H Wickman

Co-Investigator:

John Wickman

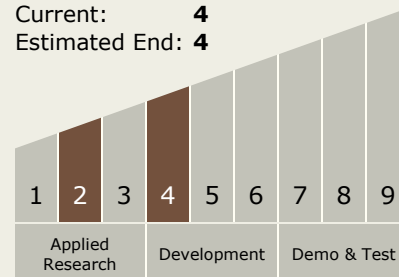
Hot Gas TVC For Planetary Ascent Vehicle, Phase I

Completed Technology Project (2010 - 2010)



Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX01 Propulsion Systems
 - └ TX01.1 Chemical Space Propulsion
 - └ TX01.1.8 Warm Gas

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System